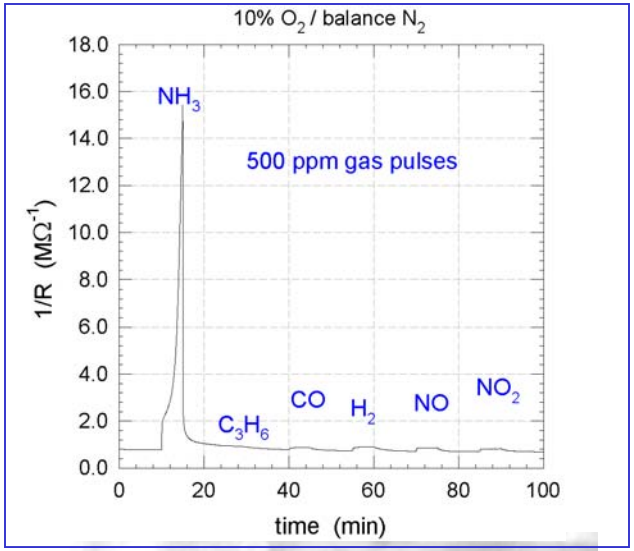
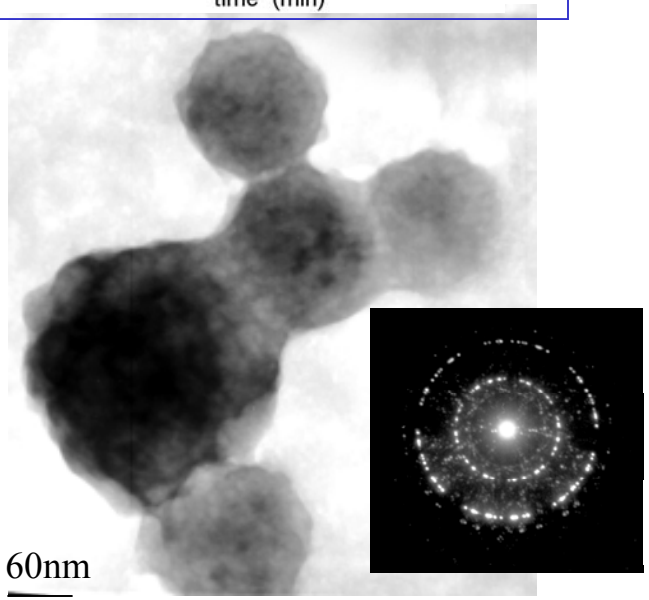
SGER: Bio-doped Electronic Ceramics for Use in Microsensors

Perena Gouma, SUNY-Stony Brook, DMR-0224642

Selective detection of toxic chemical is important to a healthy human living. In our research work we have been able to process colloidal solutions (sol-gels) of molybdenum trioxide that are very sensitive and highly specific to the detection of ammonia, as the plot to the top right of this viewgraph shows. The mechanism for this process has been studied in detail by using surface and microstructure characterization techniques and it involves the exchange of the oxide's lattice oxygen with the reacting gas during sensing.



Furthermore, incorporation of enzymes, such as urease, in the oxide sol-gels has resulted in the formation of nanocomposite structures, such as the clusters of MoO_3-urease particles seen in the transmission electron micrograph to the right. These will be used in biosensing applications, such as monitoring of urea concentration.



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Education and Outreach Activities

In collaboration with the AGEP program of SUNY that supports qualified underrepresented minority students & as part of the Summer Research Institute for Undergraduates initiative, we welcomed Ms. Oton from City College to join our program. She spent a few months in our lab carrying out a research project on biosensors. In the pictures she is spin coating thin films of oxide sol-gels and to carry out another experiment along with Ms. Lerum, an undergraduate from the engi. Sci. program of our dept. Both students enjoyed the research experience and they presented their projects at the URECA competition held at Stony Brook. Ms. Lerum will carry out graduate studies in our dept. starting next Spring.

Another outreach activity related to this NSF award was the talk given by the PI to the Conference of the Long Island Forum of Technology (LIFT) Organization last May, on the topic of sensors and society. The talk was based on research findings of this project on biosensors and its broader implications for a safer society. This was an excellent opportunity to communicate our work to a wider audience and in particular to the industrial community of Long Island, NY.